# CLAIMS

## WHAT IS CLAIMED IS:

1. A method of attenuating an optical signal comprising:

providing an optical path for the optical signal, the optical path extending from a first light transmissive structure to a second light transmissive structure, the second light transmissive structure being disposed on a movable platform such that when the movable platform is in a first position, the second light transmissive structure is aligned to receive the optical signal which is substantially unattenuated from the first light transmissive structure and when the movable platform is in a second position, the second light transmissive structure is aligned to receive the optical signal which is attenuated from the first light transmissive structure; and

moving the movable platform to the second position.

2. The method of claim 1 wherein when the movable platform is in the second position, the optical signal emerging from the first light transmissive structure diffracts over free space for a distance before the optical signal enters the second light transmissive structure.

3. The method of claim 1 wherein when the movable platform is in the first position, the optical signal emerging from the first light transmissive structure propagates over a narrow air gap before the optical signal enters the second light transmissive structure and when the movable platform is in the second position, the optical signal emerging from the first light transmissive structure propagates over a wider air gap before the optical signal enters the second light transmissive structure.

4. The method of claim 1 wherein when the movable platform is in the second position, the optical signal emerging from the first light transmissive structure is substantially attenuated to zero or near zero.

5. The method of claim 1 wherein the second light transmissive structure is a waveguide.

6. The method of claim 1 wherein the second light transmissive structure is an optical fiber.

7. The method of claim 1 further comprising providing a third light transmissive structure wherein when the movable platform is in the first position, the second light transmissive structure propagates the optical signal to the third light transmissive structure and when the movable platform is in a second position, the second light transmissive structure propagates an attenuated optical signal to the third light transmissive structure.

8. The method of claim 1 wherein as the movable platform moves away from the first position, less of the optical signal propagates from the first light transmissive structure to the second light transmissive structure.

9. The method of claim 7 wherein as the movable platform moves away from the first position, less of the optical signal propagates from the second light transmissive structure to the third light transmissive structure.

10. The method of claim 7 wherein the second light transmissive structure is a waveguide.

11. The method of claim 7 wherein the second light transmissive structure is an optical fiber.

12. The method of claim 10 wherein the first light transmissive structure is a waveguide or an optical fiber.

13. The method of claim 11 wherein the first light transmissive structure is an optical fiber or an optical fiber.

14. The method of claim 12 wherein the third light transmissive structure is a waveguide or an optical fiber.

15. The method of claim 1 wherein the first light transmissive structure is a waveguide or an optical fiber.

16. A method of attenuating an optical signal comprising:

providing an optical path for the optical signal, the optical path extending from a first light transmissive structure to a second light transmissive structure, the first light transmissive structure being disposed on a movable platform such that when the movable platform is in a first position, the first light transmissive structure is aligned to transmit the optical signal which is substantially unattenuated to the second light transmissive structure and when the movable platform is in a second position, the first light transmissive structure is aligned to transmit the optical signal which is attenuated to

the second light transmissive structure; and

moving the movable platform to the second position.

17. The method of claim 16 wherein when the movable platform is in the second position, the optical signal emerging from the first light transmissive structure diffracts over free space for a distance before the optical signal enters the second light transmissive structure.

18. The method of claim 16 wherein when the movable platform is in the first position, the optical signal emerging from the first light transmissive structure propagates over a narrow air gap before the optical signal enters the second light transmissive structure and when the movable platform is in the second position, the optical signal emerging from the first light transmissive structure propagates over a wider air gap before the optical signal enters the second light transmissive structure.

19. The method of claim 16 wherein when the movable platform is in the second position, none of the optical signal emerging from the first light transmissive structure enters the second light transmissive structure.

20. The method of claim 16 wherein the second light transmissive structure is a waveguide or an optical fiber.

21. The method of claim 20 wherein the first light transmissive structure is a waveguide or an optical fiber.

22. The method of claim 16 wherein as the movable platform moves away from the first position, less of the optical signal propagates from the first light transmissive structure to the second light transmissive structure.

23. A device for attenuating an optical signal, the device comprising:

a substrate;

a movable structure formed by a semiconductor process to be suspended over the substrate or over a cavity in the substrate;

a first waveguide disposed on the movable structure;

a second waveguide adjacent to the first waveguide;

wherein when the movable structure is in a first position, the optical signal propagates between the first and second waveguides and when the movable structure is in a second position, an attenuated optical signal propagates between the first and second waveguides.

24. The device of claim 23 wherein the second waveguide is an input waveguide adjacent to the input of the first waveguide, wherein when the movable structure is in the first position, the optical signal propagates from the second waveguide to the first waveguide and when the movable structure is in the second position, an attenuated optical signal propagates from the second waveguide to the first waveguide.

25. The device of claim 23 wherein the second waveguide is an output waveguide adjacent to the output of the first waveguide, wherein when the movable structure is in the first position, the optical signal propagates from the first waveguide to

the second waveguide and when the movable structure is in the second position, an attenuated optical signal propagates from the first waveguide to the second waveguide.

26. The device of claim 24 further comprising a third waveguide adjacent to the output of the first waveguide, wherein when the movable structure is in the first position, the optical signal propagates from the first waveguide to the third waveguide and when the movable structure is in the second position, an attenuated optical signal propagates to the third waveguide.

27. The device of claim 26 wherein when the movable structure is in the first position, the first waveguide is aligned with the second and third waveguides such that the optical signal propagates from the second waveguide to the first waveguide to the third waveguide, and when the movable structure is in the second position, the first waveguide is not aligned with the second waveguide or the third waveguide such that an attenuated optical signal propagates from the second waveguide to the first waveguide or from the first waveguide to the third waveguide.

28. The device of claim 23 wherein a free space is located between the first and second waveguides, and when the movable structure is in the first position, the free space has a length extending between the first and second waveguides, and when the movable structure is in the second position, the length of the free space is increased, the free space attenuating the optical signal.

29. The device of claim 25 wherein a free space is located between the first and second waveguides, and when the movable structure is in the first position, the free

space has a length extending between the first and second waveguides, and when the movable structure is in the second position, the length of the free space is increased, the free space attenuating the optical signal.

30. The device of claim 26 wherein a first free space is located between the first and second waveguides and a second free space is located between the first and third waveguides, and when the movable structure is in the first position, the first free space has a length extending between the first and second waveguides and the second free space has a length extending between the first and third waveguides, and when the movable structure is in the second position, the lengths of the first and second free spaces are increased.

31. The device of claim 23 wherein the movable platform moves in a single direction.

32. The device of claim 23 wherein the movable platform rotates.

33. The device of claim 25 wherein the movable platform moves in a single direction.

34. The device of claim 25 wherein the movable platform rotates.

35. The device of claim 26 wherein the movable platform moves in a single direction.

36. The device of claim 26 wherein the movable platform rotates.

37. The device of claim 28 wherein the movable platform moves in a single direction.

38. The device of claim 28 wherein the movable platform rotates.

39. The device of claim 30 wherein the movable platform moves in a single direction.

40. The device of claim 30 wherein the movable platform rotates.

41. The device of claim 23 wherein the second waveguide is a stationary waveguide or an optical fiber.

42. The device of claim 24 wherein the second waveguide is a stationary waveguide or an optical fiber.

43. The device of claim 25 wherein the second waveguide is a stationary waveguide or an optical fiber.

44. The device of claim 26 wherein the second waveguide is a stationary waveguide or an optical fiber.

45. The device of claim 28 wherein the second waveguide is a stationary waveguide or an optical fiber.

46. The device of claim 29 wherein the second waveguide is a stationary waveguide or an optical fiber.

47. The device of claim 30 wherein the second waveguide is a stationary waveguide or an optical fiber.

48. The device of claim 26 wherein the third waveguide is a stationary waveguide or an optical fiber.

49. The device of claim 30 wherein the third waveguide is a stationary waveguide or an optical fiber.

50. The device of claim 44 wherein the third waveguide is a stationary waveguide or an optical fiber.

51. The device of claim 47 wherein the third waveguide is a stationary waveguide or an optical fiber.

52. The device of claim 23 wherein the second waveguide is adjacent to the input of the first waveguide, the device further comprising

a third waveguide adjacent to the output of the first waveguide; and

a prism coupler coupled between the first and third waveguides, the prism coupler propagating the optical signal from the first waveguide to the third waveguide.

53. The device of claim 52 wherein the movable structure moves such that an air gap between the first and second waveguides changes, thereby variably attenuating the optical signal.

54. The device of claim 52 wherein the first waveguide has a curve.

55. The device of claim 53 wherein the second waveguide is a stationary waveguide or an optical fiber.

56. The device of claim 53 wherein the third waveguide is a stationary waveguide or an optical fiber.

57. The device of claim 23 further comprising a spring coupled to the movable structure and fixed to the substrate, the movable structure being suspended by the springs over the substrate or over the cavity in the substrate;.

58. The device of claim 23 further comprising an activation electrode coupled to the movable structure and an actuation electrode positioned to interact electrostatically with the activation electrode.

59. The device of claim 58 wherein the actuation electrode and activation electrode are inter-digitized.

60. The device of claim 23 further comprising a sensing electrode for determining the position of the movable structure.

61. The device of claim 41 wherein the second waveguide is disposed on an oxide layer on the substrate.

62. The device of claim 61 wherein the second waveguide comprises a core, a cladding layer which covers at least part of the core, and a buffer layer which covers at

least part of the core, the buffer being disposed on a silicon layer, the silicon layer being disposed on the oxide layer on the substrate.

63. The device of claim 23 wherein the first waveguide comprises a core, a cladding layer which covers at least part of the core, a buffer layer which covers at least part of the core, the buffer being disposed on a silicon layer, and an air gap between silicon layer and the substrate.

64. The device of claim 23 further comprising an optical switch, the output of the optical switch being coupled to the device such that the device variably attenuates the optical signal that is output from the optical switch.

65. The device of claim 64 wherein the optical switch and the device are formed on the same substrate.

66. A plurality of devices of claim 23 comprising an optical switch including a plurality of outputs, each output being coupled to one of the plurality of devices of claim 25.

67. The device of claim 23 wherein when the movable structure is in the first position, the first waveguide is aligned with the second waveguide and when the movable structure is in the second position, the first waveguide is not aligned with the second waveguide.

68. The device of claim 24 wherein the first waveguide is an optical fiber.

69. The device of claim 25 wherein the first waveguide is an optical fiber.

70. The device of claim 26 wherein the first waveguide is an optical fiber.

71. The device of claim 28 wherein the first waveguide is an optical fiber.

72. The device of claim 29 wherein the first waveguide is an optical fiber.

73. The device of claim 30 wherein the first waveguide is an optical fiber.